Cs330

Tiba alramadan

1. Justify Development Choices for Your 3D Scene

Selection of Objects:

For my 3D scene, I selected a \*\*cup\*\* and a \*\*pen\*\* to represent a minimalist desktop environment. These objects were chosen because they are everyday items, simple yet recognizable, and allowed me to demonstrate essential 3D modeling techniques using basic shapes.

Approach to Modeling

- Cup I used a cylinder for the main body of the cup and added a torus to create the handle. This allowed me to replicate the cylindrical shape of a coffee mug effectively.

- Pen: To model the pen, I utilized a long, thin cylinder for the body and added a cone to represent the pen’s tip. The simplicity of these shapes made it easy to capture the general look of a standard pen.

The choice of minimal objects enabled me to focus on foundational skills like object scaling, positioning, and alignment while ensuring the scene remained clean and visually appealing.

Textures and Materials:

- Wooden Table: I applied a wood texture to the tabletop to add realism to the environment and provide contrast to the cup and pen.

- Objects: The cup was textured with a speckled pattern to simulate a ceramic material, while the pen was given a plain black finish to make it visually distinct.

Lighting Setup:

To enhance the realism of the scene, I used:

- Directional Light: This light source simulates natural light shining from above, casting subtle shadows and highlights on the objects.

- Ambient Light: Used to ensure no part of the scene appeared completely dark, providing a balanced illumination throughout.

The combination of textures and lighting helped bring the scene to life while maintaining simplicity.

2. Explain How a User Can Navigate Your 3D Scene

Keyboard Controls:

I implemented intuitive keyboard controls to allow smooth navigation:

- W/S Move forward and backward along the Z-axis.

- A/D: Move left and right along the X-axis.

- Q/E: Move up and down along the Y-axis.

These basic controls enable users to move freely in all directions within the 3D space.

Mouse Controls:

- Mouse Movement: The mouse controls the camera’s orientation, allowing the user to look around the scene by changing pitch (up and down) and yaw (left and right).

- Scroll Wheel: Adjusts the movement speed, giving users more precise control when exploring the scene.

Camera Setup:

The virtual camera is programmed to follow the user’s input, creating a first-person perspective experience. By combining keyboard and mouse controls, users can smoothly navigate and explore the scene.

3. Explain the Custom Functions in Your Program to Make Your Code More Modular and Organized

To make my program modular and organized, I implemented custom functions that streamline specific tasks and improve code reusability. These include:

- `createObject(shape, position, scale, color)`:

- Purpose: This function generates objects based on input parameters, such as shape (e.g., cylinder, cone), position coordinates, scale factors, and color.

- Reusability: By passing different values, I can create multiple objects like the cup and pen without duplicating code.

- applyTexture(object, textureFile):

- \*\*Purpose\*\*: This function simplifies the process of applying textures to objects. It loads a texture file and maps it to the specified object.

- \*\*Reusability\*\*: I used this function to apply the wood texture to the table and the speckled texture to the cup efficiently.

- setLighting(direction, intensity)`:

- Purpose: Handles the setup of lighting parameters, such as the direction of the light source and its intensity.

- Reusability: I reused this function to configure both the directional and ambient lights, ensuring consistent lighting throughout the scene.

These custom functions promote clean, modular code and reduce redundancy. If I need to modify or add objects in the future, these functions make the process straightforward and efficient.

4. Reflection on the Development Process

Challenges Faced:

- Object Placement: Ensuring that the cup and pen were proportionate and correctly positioned on the table required careful adjustments to scaling and positioning values.

- Texture Mapping: Applying the speckled texture to the cup while maintaining a realistic appearance took trial and error with UV mapping.

- Camera Control: Programming smooth navigation and camera rotation using keyboard and mouse inputs was initially challenging but ultimately rewarding.

Learning Outcomes:

This project deepened my understanding of 3D scene development, particularly:

- Using primitive shapes to model complex objects like a cup and pen.

- Managing textures and lighting to create a visually appealing and realistic environment.

- Implementing navigation controls for user interaction within the scene.

Improvements for the Future:

- Increased Complexity: I would like to add more detailed objects, such as books or a laptop, to enhance the realism of the desktop environment.

-Interactivity: Implement functionality that allows users to interact with objects, such as picking up the pen or rotating the cup.

-Advanced Lighting: Experiment with spotlights or shadows to further improve the scene’s lighting effects.

Conclusion

This project provided valuable experience in 3D modeling, texture application, and camera control programming. By focusing on a minimalistic yet realistic desktop scene, I was able to demonstrate foundational 3D development skills while keeping my code organized and modular. Moving forward, I aim to enhance my 3D scenes with greater complexity and interactivity to create more engaging virtual experiences.